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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/583,421	06/19/2006	Loes Elizabeth Bevers	F7752(V)	1710

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EXAMINER	
THAKUR, VIREN A	

ART UNIT	PAPER NUMBER
1794	

NOTIFICATION DATE	DELIVERY MODE
01/06/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentgroupus@unilever.com

Office Action Summary	Application No.	Applicant(s)	
	10/583,421	BEVERS ET AL.	
	Examiner	Art Unit	
	VIREN THAKUR	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 September 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,6,7 and 11-18* is/are pending in the application.

4a) Of the above claim(s) *11-15* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,6,7 and 16-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. As a result of the amendment to the claims, which now limit the cross-linked biopolymer to a "sugar beet pectin having chemically attached feruoylated glycerides, chitosan having covalently coupled vanillin groups and chitosan having covalently coupled vanillin groups and chemically attached feruoylated glycerides," those rejections under 35 U.S.C. 102(b) and 35 U.S.C. 103(a) not restated herein have been withdrawn.

Claim Objections

2. Claim 18 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 18 repeats the limitations of claim 17, from which claim 18 depends.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 1,6-7 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiura et al. (JP05-168401A) in view of Muzzarelli (GB2272447) as further evidenced by Hall et al. (US 4424346) and in further view of Ninomiya et al. (US 5089307) and Franzoni (US 5077052 A).

Regarding claim 1, it is noted that the claim does not positively recite the edible barrier being on a food and further does not limit the particular type of food or how the edible barrier material is associated with the food. Thus, claim 1 also reads on additives encapsulated with edible barrier materials.

In any case, regarding claim 1, Nishiura et al. teaches providing an edible barrier "for use" in food products, comprising chitosan (see abstract and paragraph 0010 of the machine translation), vanillin (see abstract and paragraph 0014 of the machine translation) and a lipid material such as a glycerol ester (paragraph 0015 of the machine translation).

Claim 1 differs from Nishiura et al. in reciting that the edible barrier comprises a covalently cross-linked biopolymer selected from sugar beet pectin having chemically attached feruoylated glycerides, chitosan having covalently coupled vanillin groups and

chitosan having covalently coupled vanillin groups and chemically attached feruoylated glycerides.

It is noted however, that Muzzarelli teaches cross-linking chitosan with an aldehyde, such as vanillin (see page 4 and page 5 paragraph beginning with "The preferred aldehydes..."). As a result of the interaction between the chitosan and the aldehyde such as vanillin, the film that can be produced is improved strength and improved insolubility (see page 7). To thus modify Nishiura et al. and interact the chitosan with vanillin, as taught by Muzzarelli would have been obvious to one having ordinary skill in the art, for the purpose of improving the strength of the film.

Regarding the cross-linked covalent coupling of vanillin groups, it is noted that Muzzarelli teaches a process for combining chitosan with vanillin that is substantially similar to that disclosed in applications specification, page 11, lines 9-27). That is, Muzzarelli teaches dissolving chitosan in an acidic aqueous medium and then adding the aldehyde (see page 6, 1st-4th full paragraph and the 5th paragraph). It is noted that Muzzareli also teaches a Schiff reaction, which applicants disclose on page 7, lines 2-3 is another mechanism for coupling vanillin to the chitosan backbone. This is further evidenced by Hall et al., who teaches that Schiff base formation and reductive amination provides a convenient route for attaching a wide range of molecules to chitosan (column 3, lines 45-54 and lines 55-62). Thus, it is noted that applicants are not the first to covalently link chitosan with vanillin to form a cross-linked biopolymer. It is further noted that Ninomiya et al. also teaches crosslinking a substance to chitosan, for the purpose of improving the strength of the film (column 4, lines 7-15).

Claim 1 further differs from the above combination in specifically reciting the use of a lipid such a fat, oil or wax and wherein the thickness of the edible barrier is from about 2 to 1500 micrometers (claim 1), 10-500 micrometers (claim 6) and 50-200 micrometers (claim 7).

Regarding the use of a lipid such as oil, fat or wax, it is noted that Iverson et al. teaches employing edible compositions for coating foodstuffs, wherein the composition comprises chitosan and further teaches the inclusion of an edible wax, such as carnauba wax (paragraph 0028), which increases the coating adhesion and further retards moisture loss from the coated food item during storage (paragraph 0028). To thus modify the combination and also include an edible wax, would thus have been obvious to one having ordinary skill in the art, for the purpose of increasing the coating adhesion and further regarding moisture loss from the coated food item during storage.

Regarding the particular thickness of the edible barrier, as recited in claims 1, 6 and 7, it is noted that the particular thickness, it is noted that since the art already teaches applying the edible barrier as a coating onto a material, the particular thickness of the barrier would have been a function of the particular food and the particular barrier properties desired.

In any case, Franzoni et al. teaches that it has been conventional in the art to produce a film comprising chitosan, wherein the film coats a food product such as feedstuff additives, and has a thickness of 50 microns, for instance (column 7, lines 60-61). Ninomiya et al. further evidences edible films that can comprise chitosan (column 4, lines 7-15 and column 7, lines 23-27). Thus, the particular thickness of the film would

have been an obvious result effective variable, routinely determinable by experimentation, depending on the particular packaging purpose, sealability and concentration of the film desired.

Regarding claim 16, the combination as applied to claim 1 teaches employing chitosan having covalently coupled vanillin groups.

6. Claims 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 1, 6-7, 16 above in paragraph 5, and in further view of Heilemann et al. (WO2001004207).

It is noted that the US Pre-grant Publication (US 20050272922) has been relied on as a translation of the WIPO publication WO2001004207).

Claims 17 and 18 recite the particular weight ratio of chitosan to vanillin. Regarding this ratio, it is noted that Muzzarelli teaches that one weight of chitosan reacts with about half that weight of vanillin (i.e. 1:~0.5) (see page 10, paragraph beginning with "Results..."), which is a ratio of chitosan to vanillin of 2:1. Nevertheless, the particular ratio is also dependent on the particular reaction time and the particular vanillin and thus the particular amount of vanillin present when reacting with chitosan would have been an obvious result effective variable, routinely determinable by experimentation depending on the desired strength properties desired of the resultant chitosan, vanillin biopolymer.

Additionally, Heilemann et al. has only been relied on to teach that it has been conventional in the art to produce films that can be used for food application (paragraph

0102 and 0104) wherein chitosan has been employed and can be combined with auxiliary additives, such as vanillin (paragraph 0040 and 0078), wherein these additives have been added at 0.5 to 10% by weight based on the dry weight of chitosan (paragraph 0100). This addition can occur prior to or together with the addition of the precipitant (paragraph 0036) but before crosslinking (paragraph 0034). Thus, Heilemann et al. teach that it has been conventional to employ a weight ratio of chitosan to vanillin within applicants' claimed range, when crosslinking the chitosan with the other additives. Thus, the particular amount of the vanillin incorporated by the crosslinking taught by Muzzarelli would have been an obvious result effective variable, routinely determinable by experimentation depending on the desired strength properties desired of the resultant chitosan, vanillin biopolymer.

7. Claims 1, 6-7, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iverson et al. (US 20030203084 A1) in view of Muzzarelli (GB2272447) as further evidenced by Hall et al. (US 4424346) and in further view of Ninomiya et al. (US 5089307) and Franzoni (US 5077052 A).

Regarding claim 1, Iverson et al. teaches employing edible compositions for coating foodstuffs, wherein the composition comprises chitosan and further teaches the inclusion of an edible wax, such as carnauba wax (paragraph 0028), which increases the coating adhesion and further retards moisture loss from the coated food item during storage (paragraph 0028). Claim 1 differs from Iverson et al. in specifically reciting that

the edible barrier comprises a covalently cross-linked biopolymer selected from sugar beet pectin having chemically attached feruoylated glycerides, chitosan having covalently coupled vanillin groups and chitosan having covalently coupled vanillin groups and chemically attached feruoylated glycerides.

It is noted however, that Muzzarelli teaches cross-linking chitosan with an aldehyde, such as vanillin (see page 4 and page 5 paragraph beginning with "The preferred aldehydes..."). As a result of the interaction between the chitosan and the aldehyde such as vanillin, the film that can be produced is improved strength and improved insolubility (see page 7). To thus modify Iverson et al. and interact the chitosan with vanillin, as taught by Muzzarelli would have been obvious to one having ordinary skill in the art, for the purpose of improving the strength of the film.

Regarding the cross-linked covalent coupling of vanillin groups, it is noted that Muzzarelli teaches a process for combining chitosan with vanillin that is substantially similar to that disclosed in applications specification, page 11, lines 9-27). That is, Muzzarelli teaches dissolving chitosan in an acidic aqueous medium and then adding the aldehyde (see page 6, 1st-4th full paragraph and the 5th paragraph). It is noted that Muzzareli also teaches a Schiff reaction, which applicants disclose on page 7, lines 2-3 is another mechanism for coupling vanillin to the chitosan backbone. This is further evidenced by Hall et al., who teaches that Schiff base formation and reductive amination provides a convenient route for attaching a wide range of molecules to chitosan (column 3, lines 45-54 and lines 55-62). Thus, it is noted that applicants are not the first to covalently link chitosan with vanillin to form a cross-linked biopolymer. It

is further noted that Ninomiya et al. also teaches crosslinking a substance to chitosan, for the purpose of improving the strength of the film (column 4, lines 7-15).

Claim 1 further differs from the above combination in specifically reciting the thickness of the edible barrier is from about 2 to 1500 micrometers (claim 1), 10-500 micrometers (claim 6) and 50-200 micrometers (claim 7).

Regarding the particular thickness of the edible barrier, as recited in claims 1, 6 and 7, it is noted that the particular thickness, it is noted that since the art already teaches applying the edible barrier as a coating onto a material, the particular thickness of the barrier would have been a function of the particular food and the particular barrier properties desired.

In any case, Franzoni et al. teaches that it has been conventional in the art to produce a film comprising chitosan, wherein the film coats a food product such as feedstuff additives, and has a thickness of 50 microns, for instance (column 7, lines 60-61). Ninomiya et al. further evidences edible films that can comprise chitosan (column 4, lines 7-15 and column 7, lines 23-27). Thus, the particular thickness of the film would have been an obvious result effective variable, routinely determinable by experimentation, depending on the particular packaging purpose, sealability and concentration of the film desired.

Regarding claim 16, the combination as applied to claim 1 teaches employing chitosan having covalently coupled vanillin groups.

8. Claims 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 1, 6-7, 16 above in paragraph 7, and in further view of Heilemann et al. (WO2001004207), for the reasons given above in paragraph 6.

9. Claims 1, 6-7, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haugaard in view of Muzzarelli (GB2272447) as further evidenced by Hall et al. (US 4424346) and in further view of Ninomiya et al. (US 5089307), Iverson et al. (US 20030203084 A1) and Franzoni (US 5077052 A).

Regarding claim 1, Haugaard teaches that it has been conventional to apply chitosan edible films to foods, for the purpose of protecting the food (see page 193, "Fruits and Vegetables" and "Edible Coating."

Claim 1 differs from Haugaard in reciting that the edible barrier comprises a covalently cross-linked biopolymer selected from sugar beet pectin having chemically attached feruoylated glycerides, chitosan having covalently coupled vanillin groups and chitosan having covalently coupled vanillin groups and chemically attached feruoylated glycerides.

Nevertheless, Muzzarelli, Hallet al. and Ninomiya et al. have been relied on as discussed in paragraphs 5 and 7, above, to teach that has been advantageous to crosslink chitosan with vanillin for the purpose of improving the strength of the film. To thus modify the film taught by Haugaard and crosslink chitosan with vanillin would thus

have been obvious to one having ordinary skill in the art, for the purpose of improving the strength of the film.

Claim 1 further differs from this combination in specifically reciting that the film further comprises a lipid such as an edible oil, fat or wax and further differs in the particular thickness of the film.

Regarding the lipid, Iverson et al. has been relied on as discussed above in paragraphs 5 and 7, to teach that it has been conventional to include an edible wax, such as carnauba wax for the purpose of improving the adhesion properties and retention of moisture within the food. To thus modify the combination and further include a wax, as taught by Iverson et al. would have been obvious to one having ordinary skill in the art, for the purpose of improving the adhesion properties and retention of moisture within the food.

Regarding the thickness as recited in claims 1, 6 and 7, Ninomiya et al., and Franzoni have been relied on, as discussed above in paragraphs 5 and 7, above, to teach that the particular thickness of the film would have been an obvious result effective variable, routinely determinable by experimentation.

Regarding claim 16, the combination as applied to claim 1 teaches vanillin covalently coupled to chitosan.

10. Claims 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claims 1, 6-7, 16 above in paragraph 9, and in

further view of Heilemann et al. (WO2001004207), for the reasons given above in paragraph 6.

Response to Arguments

11. Applicants argument on pages 5-11 regarding the previous rejections failing to teach covalently cross-linked biopolymers has been considered but is moot in view of the new grounds of rejection stated above, which were necessitated by the amendment which further limited the particular biopolymer composition.

12. Applicants' urging that since the special technical feature recited in claim 1 is shared by all the claims that the claims should be rejoined, has been considered but is not persuasive. It is noted that although claim 1 recites the particular biopolymer composition, the particular biopolymer composition of a covalently cross-linked biopolymer of chitosan having covalently coupled vanillin groups has been disclosed in the prior art, as evidenced by the reference to Muzzarelli and thus the technical feature common to the claims would not have provided a contribution over the prior art. Davison et al. (US 20030104020 A1) further teach chitosan coupled with vanillin (paragraph 0151) which can include lipid compounds (paragraph 0048), using a Schiff base reaction (paragraph 0172). House (US 6291404) further evidences using Schiff base reactions to couple chitosan (column 2, lines 8-15; column 3, lines 61-67) with vanillin (column 5, line 12), which would achieve a cross-linked, covalently bonded

biopolymer, since applicants also employ a Schiff base reaction to achieve the vanillin coupled to the chitosan, as indicated on page 7, lines 2-3 of applicants' specification.

Additionally, it is also noted that group I does not relate to a single inventive concept when compared to groups II and III. That is, group I is only directed to edible barriers, while group II is directed to barriers applied in a particular arrangement on foods, while group III is directed to an enzymatic oxidation when preparing a food product.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 5571527, US 5429832 disclose a matrix comprising chitosan and other additives such as a physiologically active substance which coats animal rumen.. US 20020110620 discloses coatings comprising a combination of waxes and chitosan (paragraph 0107).

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to VIREN THAKUR whose telephone number is (571)272-6694. The examiner can normally be reached on Monday through Friday from 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rena Dye can be reached on (571)-272-3186. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/V. T./
Examiner, Art Unit 1794

/Rena L. Dye/
Supervisory Patent Examiner, Art Unit 1794